Digital transformation of project implementation monitoring in the regional public management

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Abstract — **The relevance of the article is caused by the necessity to use information technologies and digital methods during the project implementation monitoring process, taking place in the regional public management system. The objective of this paper is to develop the pattern in order to carry out efficient digital transformation for project implementation monitoring in the regional public management. By modeling this pattern one should take into account the classification of project implementation theoretical aspects, as well as the practical involvement of information technologies into the process of monitoring in Russia at regional level. The article clarifies the notion of "monitoring" in the area under study. The study identifies the practical use of information technologies during project implementation monitoring in the regional public management, discusses best practices and two most common solutions. The author defines requirements for project information management system, employed to monitor regional projects, aimed at preserving national interests. The paper elaborates a flexible pattern in order to carry out digital transformation of project implementation monitoring in the regional public management. This pattern considers process phasing and the need to make transition from technological transformation to the digital one. The author distinguishes between technological and digital kinds of transformation, proposes mathematical inequation that should be maintained, if the transition to the digital transformation of motoring is carried out. The results of the study are practically relevant for the government, project managers and scientists, engaged in digital economics and management**.

Keywords — monitoring, project, public management, region

I. INTRODUCTION

Nowadays there are two ways of project approach implementation in the public management: to achieve strategic goals through national, federal and regional projects; to involve public authorities in the management of projects that require intersectoral interaction (public–private partnership, concession, special investment contract, participatory budgeting [1]).

Most projects of the public management system have mid or long-term objective fulfilment period and require the monitoring system that will consider the digital transformation lines, specified for the public authorities in the strategic agenda up to 2024.

The digital transformation in its broad sense is defined as the change, associated with the digital technologies use that affects all the aspects of society [2].

The researchers. E.I. Dobrolubova, V.N. Yuzhakov, A.A. Efremov, E.N. Klotchkova, E.V. Talapina and Ya.Yu. Strartsev [3] point out that the strategical development center experts give the following definition of the digital transformation: "this is a deep reorganization of business processes reengineering, in which digital tools act as special process enforcement mechanisms. Such reorganization results in substantial improvement of process features (process execution time reduction, elimination of some sub-processes groups, output increase, drop in resources, spent on processes execution etc.) and/or emergence of traits and properties that are crucially new for these processes (automatic decision-making without human participation etc." [4].

In this light it is too early to discuss digital transformation implementation into the public management due to the existing degree of automatization, regarding monitoring process. The issue is burning at the regional and municipal level.

Just a few regions have managed to create conditions, enabling proper media support for national projects, carried out on their territory, i.e. they began to effectuate technological transformation of project management media support. This is considered to be the first stage of the digital transformation.

The objective of this paper is to develop the pattern in order to carry out efficient digital transformation for project implementation monitoring in the regional public management. By modeling this pattern one should take into account the classification of project implementation theoretical aspects, as well as the practical involvement of information technologies into the process of monitoring in Russia at regional level.

II. STUDY METHODOLOGY

Systemic analysis is the main method, employed during this study. It allows to regard digital transformation of project implementation monitoring in the regional public management as a part of managerial mechanism, involved in media support process for the corresponding project management branch.

We carried out benchmarking as a part of analysis of practical implementation of information technologies into the monitoring process. The benchmarking procedure was based on the open source data. The authors proposed a minimal module complex, required for project monitoring in regional public management. It was further taken for the reference value for the procedure.

The simulation approach was employed to make a formal description of the practical use of digital transformation of project implementation monitoring in the regional public management.

The data sample includes information, hosted on official web-sites of the regional authorities, as well as provided by Russian data systems developers and the Analytical Centre, affiliated to the Government of the Russian Federation.

III. RESULTS AND DISCUSSION

A. *Project Implementation Montoring in the Regional Public Management:Notion and Essence*

Various sources have different interpretations of the interdisciplinary term "monitoring".

As per GOST R ISO 9000-2015 "National standard of the Russian Federation. Quality management systems. Fundamentals and glossary" monitoring is the determination of the system status, process, goods, services or activity.

As a rule, monitoring is the process of object status determination that is performed at different work stages or in different work periods.

A.N. Mayorov argues that if we consider the notion of monitoring as a general scientific category, then we should give the following definition: "Monitoring is the system of collection, processing, storage and distribution of information about any other system or its elements. Monitoring provides data support in order to manage other systems, it helps to evaluate their state at any time point and to predict their development [5].

T.I. Borovkova and I.A. Morev put forward the idea that the approaches to the definition of the term "monitoring" should be classified, taking into consideration various features. The key feature in this case is the area of application, for it allows to determine various kinds of the object in question.

The authors distinguish between different kinds of monitoring in various spheres: in economics and in business, in politics, political science and sociology, in education, ecology, biology and medicine [6].

Given classification can be supplemented by monitoring, applied for any legal standard implementation.

For instance, central and local government procurement monitoring is the system of regularly performed observations, realized by means of collection, summarizing, systematization and evaluation of the procurement data, including procurement schedules and graphic plans.

Economics possess the maximum variety of the monitoring kinds: socio-economic one; institutions' financial state monitoring, including credit organizations, taxpayer monitoring; bank monitoring etc.

Project implementation monitoring in the regional public management should be regarded both political and economic, if the projects help to attain national goals and preserve national interests and only as economic one, if we speak about public–private partnership or participatory budgeting projects.

This statement corresponds to S.S. Sulakshin's point of view, according to which "state policy monitoring implies measurement of values that are relevant to the state policy goal. These values should characterize control object state" [7].

Charles S. Wasson argues that the monitoring helps to identify trends for certain values. These trends give the possibility to predict indicator values and foresee further system state. In such a case there is no need to bring the system into more stable state by means of retarded and uncertain data [8].

Thus, project implementation monitoring in the regional public management is the system of collection and systematization of information, regarding the implementation of projects that require intersectoral interaction, involving regional authorities or regional projects, aimed at attaining national goals in order to identify deviations from planned values and work out project risks mitigation measures.

Thus, the established regional monitoring system should be able to identify public–private partnership projects risks. The process should involve regional authorities. The possible public–private partnership projects risks are listed in table 1 below.

TABLE I. THE PUPLIC- PRIVATE PARTNERSHIP RISKS THAT SHOULD BE IDENTIFIED DURING PROJECT MONITORING

Risk group	Risks
Project development and preliminary stage risks	Land plots granting; engineering services provision; land plots preparation; design time failure; preliminary activities time failure.
Object construction risks	Relieving the consequences of the third parties'actions; settlement of natural disasters or other circumstances of insuperable force, environmental consequences liquidation ; Construction or reconstruction time failure Launch time failure; Increase in expenditures for construction due to currency rate growth ; Increase in expenditures for construction due to pace of inflation; Increase in expenditures for construction due to debt interest growth .
Operational risks	Increase in expenditures for operation of property, transferred to public partners; Increase in expenditures for operation due to currency rate growth;

	Increase in expenditures for operation due to pace of inflation; Increase in expenditures for operation due to debt interest growth; Increase in expenditures for operation due to tax hikes.
Revenue generation risks	Non-receipt of payments that assure hurdle rate; gain reduction due to decrease in rendered services volume; gain reduction due to decrease in prices (rates) for services; gain reduction due to default in payments on behalf of customers.

Nowadays if we want to preserve national interests and attain national goals we should monitor their implementation and fulfilment at the national level from the very beginning. This is a crucial point.

It is worth mentioning that nowadays there are 12 national projects in Russia. It is necessary to work out several federal projects to fulfill each national one. Every region develops several projects for their further implementation at the corresponding territory.

Regional project offices should monthly summarize and check data about regional project implementation. This information is indispensable for the federal project reports, which are compiled by the participants of the corresponding regional projects. The regional offices should submit this data to the federal project manager and to the project office of the Government of the Russian Federation not later than on the 4th working day of the following accounting month.

This data should be systematized and taken into account during federal and national projects monitoring.

National and federal projects implementation monitoring should represent a system of activities, aimed at evaluating actual parameters of these projects, at calculating the deviations of actual parameters from planned ones, at analyzing root causes of such deviations, at forecasting the progress of the project implementation, at making managerial decisions on determination, approval and making possible corrective actions.

As for the federal level, compilation, coordination approval and submission of documents and data, drafted during project activities should be done within state integrated management information system for public finance distribution that is called "Electronic budget". The monitoring of these processes should be carried out under this program as well.

Every constituent of the Russian Federation has its own regional project information management system.

B. Project Management Information Systems in the Regional Public Management Systems

Nowadays the project approach is widely employed in the following regions of the Russian Federation: Primorsky Krai; the Belgorod region; the Volgograd region; the Sakhalin region; the Ulyanovsk region; the Yaroslavl region; the Penza region; the Novgorod region; the Sverdlovsk region; the Republic of Bashkortostan; the Khanty-Mansijsk Autonomous District-Yugra, the Tumen region etc.

The Belgorod region; the Khanty-Mansijsk Autonomous District-Yugra; the Leningrad region; the Krasnoyarsk Krai and the Ulyanovsk region formed top 5 regions, included in the pilot group per project activity index. The rating was made by the Federal project office.

According to the Analytical Centre affiliated to the Government of the Russian Federation the Primorsky Krai is the most successful region in this regard.

The project activity index is a new tool in the project activities management system that allows to identify federal ministries and regions with the best management systems.

The index takes into account 5 basic elements: long-range planning and project portfolio management; project management; decision-making and administrative support; competence development and culture of effectiveness; project participants' stimulation management.

Most constituents of the Russian Federation have successful experience of project approach implementation. They use regional and municipal integrated data systems that ensure the required interlayer interaction level.

For instance, the interlayer interaction level in the Khanty-Mansiisk Autonomous District-Yugra (KhMAD-Yugra), allows:

- To ensure mutual information exchange between the KhMAD-Yugra project committee, municipal administration project committee and the KhMAD-Yugra central project office;

- To ensure mutual information exchange between municipal project offices municipal administration departments and operational project offices of the sectoral executive agencies in the KhMAD–Yugra;

- To submit information from the KhMAD–Yugra project committee to the municipal project offices

- To submit information from the KhMAD–Yugra central project office to the operational project offices of the sectoral executive agencies in the KhMAD–Yugra.

In the Primorsky Krai there are the following modules that ensure proper PIMS functioning: program management projects certification module; project portfolio management module, contract management module; project initiative management module; non-project activities management module; meetings management module; errands management module; deadlines management module, performance management module, personnel management module, project finance management module; risk and burning and pending issues management module; project reporting module; project analytical reporting and monitoring module; changes management module; database management module and project documentation storage module.

The PIMS in the Primorsky Krai also includes 4 sustaining modules. The module that provides cooperation with the allied data systems in the region is extremely important for the project management integration into the strategic planning system.

Open data sources permit to conclude that most regions that have incorporated project management into the public sector use various data systems based on:

- Platform-database Motiware Melody One. System web-interface provides an access to all the necessary data for all project activities participants any time and from any part of the world. You will only need network connection and a web-browser to get the access.

- "Advanta" or "PM FORSITE" data systems.

"The Advanta" system won the special nomination "Best Russian project information management system" at the contest "Best data analytics tools – 2016". The contest was held by the Analytical Centre, affiliated to the Government of the Russian Federation.

If we speak about the government officials participation monitoring in the project activities, then the main advantage of this system is the project portfolio monitoring panel.

The system monitors both the complexes of interrelated programs and projects and particular projects, relying on such indicators as: "Project status"; "Check points diagram";" Reports on forecasts of check points reaching "; "Report on budget overrun control"; "Task status report"; "Report on complying with articles"; Expenses and revenues budget per articles".

For instance, "Check points diagram" is the project map, stamped with planned results and status of their obtaining [9].

A new version of "PM FORSITE" for the public sector gives the possibility to determine regional constituents for the national projects (programs) according to the guidelines, established by the Decree of the President of the Russian Federation № 204 dated 7 May 2018. The projects in the regional PIMS are clustered into the corresponding national projects, such documents as "the datasheet for the regional component of the national project" and "Supplementary and supporting materials" can be generated automatically per federal project office guidelines. Besides, the system contains purpose registry, which was preliminary filled pursuant to the Decree of the President of the Russian Federation № 204, the system provides the possibility to build the tree of current objectives, according to the regional strategy of socio-economic development etc.

Besides, the "indicator management" module partially monitors the regional project implementation in this system.

"Indicators management" allows:

- To track the changes and results for indicators that are typical for all projects, portfolios and programs, such as deadlines, financing, resources, risks, quality;

- To generate graphs for current data values, to compare values in the course of time;

- To create particular measures of efficency of individual projects implementation, that means to assign planned values for certain periods of time and track the actual values attainment per time check points;

- To calculate project implementation cumulative rates.

The generalized analysis of the PIMS functionality in the public sector, as exemplified by sample of regions with the corresponding open data, has revealed the following peculiarities, summarized in fig. 1.

Function Region	1	2	3
Primorsky Krai	■	■	■
The Belgorod region	■	■	■
The Ulyanovsk region, The Leningrad region, Khanty-Mansiisk autonomous district-Yugra	□	■	□

1 Project initiatives monitoring;
2 Resources monitoring;
3 Risk monitoring
■ – Module works;
□ – Module doesn't work.

Fig.1. Functionality of PIMS monitoring modules, as exemplified by region sample

The summary of PIMS functionality in the regional public management showed that the duality of the project-based approach implementation in the public structures isn't taken into account. The values for regional projects, aimed at reaching national goals are not automatically registered.

To comply with the legal standards for implementation of the regional projects, aimed at reaching national goals, the information systems of every constituent of the Russian Federation should have the modules with the following possibilities:

- To generate the overall project status that reflects the project state, considering the following indicators: risks; values; budget; results; check points. The absence of deviations, the presence of deviations, the presence of critical deviations and forecast data may act as value indicators in this case.

- To present budget performance status for the regional project in the form of diagrams, which visualize project financing from different sources, using the following criteria: actually performed; performance risks; financial assets balance.

- To track the achievements per check points, i.e. project stages, using the diagram (graph). The comparative assessment indicators: planned value; actual value; forecast [10].

The diagram (graph) of reaching regional projects check points that should be created by the PIMS, employed in the regional public management systems is shown in fig.2.
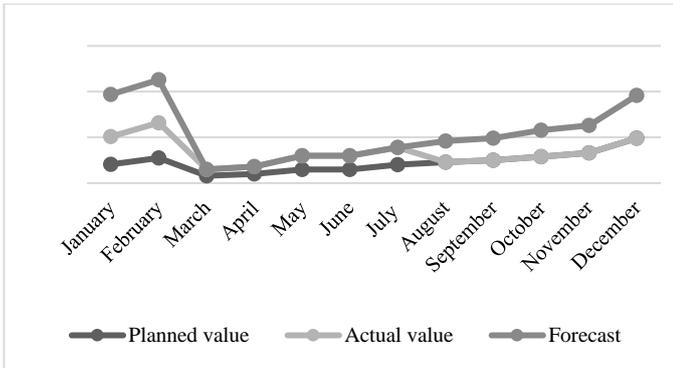
Fig. 2. The diagram (graph) of reaching regional projects check points created during implementation monitoring

This is the example of 8 risks for the projects. The data system should automatically register such risks, as well as any deviations. In other words, the PIMS should collect reporting data and process it on its own.

C. Pattern for Digital Transformation of Project Implementation Monitoring in the Regional Public Management

The pattern for digital transformation of the process in question is presented in fig. 3. It is based on the analysis of the academic sources, as well as experiences of information technologies practical use during the project implementation monitoring in the regional public management.
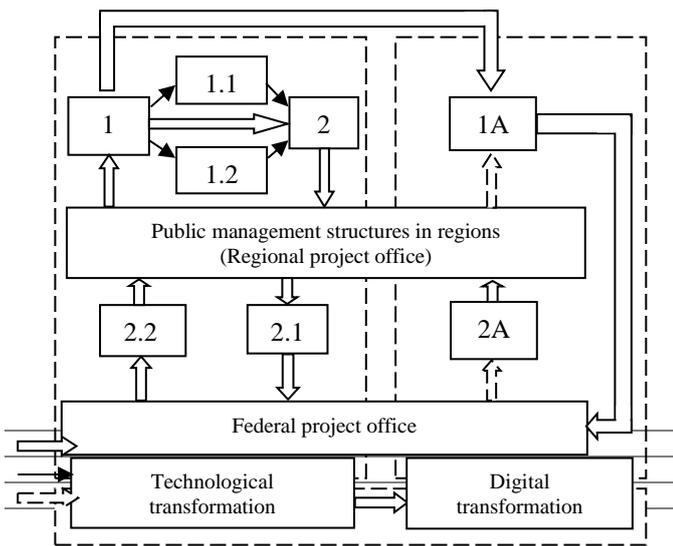
1	
1.1	Information support for management of projects that require inter-sectoral interaction
1.2	Information support for management of projects, aimed at reaching national goals.
2	Collection and processing of information about regional projects implementation, elaboration of reports on monthly monitoring values разработка
2.1	Submission of regional monitoring values for federal projects, aimed at reaching national goals
2.2	Responses on regional monitoring values for federal projects, aimed at reaching national goals
1A	Automatic compilation and submission of regional project monitoring values on a monthly basis
2A	Automatic compilation and submission of documents that contain responses on regional monitoring values for federal projects, aimed at reaching national goals

Fig. 3. Pattern for digital transformation of project implementation monitoring in the regional public management.

This pattern reflects the authors' point of view according to which the technological transformation is the first stage of the digital transformation that can also be regarded as an independent element.

The crucial difference between technological and digital transformation resides in the levels of the monitoring processes automatization and human participation in these processes.

Besides, the successful transition from technological to digital transformation should be accompanied by the increase in labor costs reduction rate for monitoring implementation.

In other words, we should maintain the following inequation:

$$K_t = \frac{\Delta T}{T_0} < K_{t1} = \frac{\Delta T_1}{T_{01}}, \qquad (1)$$

Where, K_t is the annual labor costs reduction rate, resulting from technological transformation of project implementation monitoring in the regional public management;

ΔT – annual absolute value of labor costs reduction for regional projects monitoring in public management structures after and before the PIMS implementation;

$T_0 -$ basic annual labor costs for project implementation monitoring in the regional public management before the PIMS launching;

Where, K_{t1} is the annual labor costs reduction rate, resulting from digital transformation of project implementation monitoring in the regional public management;

$\Delta T_1 -$ annual absolute value of labor costs reduction for regional projects monitoring in public management structures after and before digital transformation;

$T_{01} -$ basic annual labor costs for project implementation monitoring in the regional public management under technological transformation.

IV. CONCLUSION

The conducted regional experience analysis drives us to the conclusion that nowadays it is too early to speak about full digital transformation of the process in question.

The regional public management structures in Russia should start with the first stage – they ought to carry out technological transformation, which can provide sufficient media support for public-private partnership, concession, special investment contracts, participatory budgeting and regional projects, aimed at reaching national goals.

The authors of this paper proposed a pattern that takes into account all the peculiarities of the process in question. It can be

employed to launch and boost the process in regions and for further investigations as well.

The results of the study are practically relevant for the government, project managers and scientists, engaged in digital economics and management.

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